

The ICESat-2 Mission: Concept, pre-launch activities, and opportunities

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ABSTRACT

Ice sheet and sea level changes have been explicitly identified as a priority in the President's Climate Change Science Program, the Arctic Climate Impact Assessment, the 4th Assessment Report of the IPCC and other national and international policy documents. Following recommendations from the National Research Council for an ICESat follow-on mission, the ICESat-2 mission is now under development for launch in early 2016. The primary aims of the ICESat-2 mission are to continue measurements of sea-ice thickness change, and ice sheet elevation changes at scales from outlet glaciers to the entire ice sheet as established by ICESat. In contrast to ICESat, ICESat-2 will employ a 6-beam micro-pulse laser photon-counting approach. The current concept uses a high repetition rate (10 kHz; equivalent to 70 cm on the ground) low-power laser in conjunction with single-photon sensitive detectors to measure range using ~532nm (green) light. The concept will enable the generation of seasonal maps of ice sheet elevation of Greenland and Antarctica, monthly maps of sea ice thickness of the polar ocean, a dense map of land elevation (2 km track spacing at the equator after two years) enabling the determination of canopy height, as well as ocean heights.

While the mission has been optimized for cryospheric science and vast amount of high precision elevation measurements taken over land and over the ocean as well as of the atmosphere will provide scientists with a wealth of opportunities to explore the utility of ICESat-2. Those will range from the retrieval of cloud properties, to river stages, to snow cover, to land use changes and more.

The presentation will review the measurement concept and physical principles of ICESat-2, current and planned activities to assess instrument performance and develop geophysical algorithms, as well as potential opportunities outside the main objectives of ICESat-2.